

CLAIMS

1. Electrolytic process for plasma microarc oxidation for the purpose of obtaining a ceramic coating on the surface of a metal having semiconducting properties, such as aluminium, titanium, magnesium, hafnium, zirconium and their alloys, by a physico-chemical transformation reaction of the treated metal, characterized in that it consists in:
- 5 - immersing the metal workpiece (5) to be coated in an electrolytic bath (3) composed of an aqueous solution of an alkali metal hydroxide, such as potassium hydroxide or sodium hydroxide, and of an oxyacid salt of an alkali metal, the metal workpiece forming one of the electrodes; and
- 10 - applying a signal voltage of overall triangular waveform to the electrodes, that is to say a signal having at least a rising slope and a falling slope, with a form factor that can vary during the process, generating a current which is controlled in its intensity, its waveform and its ratio of positive intensity to negative intensity.
- 15 2. Process according to Claim 1, characterized in that the rising and falling slopes of the voltage signal are approximately symmetric.
- 20 3. Process according to Claim 1, characterized in that the rising and falling slopes of the voltage signal are asymmetric and have angles which vary during the electrolysis.
- 25 4. Process according to one of Claims 1 to 3, characterized in that it consists in making the value of the triangular voltage change between 300 and 600 Vrms during the process.
- 30 5. Process according to one of Claims 1 to 4, characterized in that it consists in making the frequency of the triangular signal vary between 100 and 400 Hz during the process.
- 35 6. Process according to one of Claims 1 to 5, characterized in that it consists in making the value

of the current vary or to fix it independently of the value of the voltage.

7. Process according to the combination of Claims 1 to 6, characterized in that it consists in varying the various parameters, namely the form factor, the value of the potential, the frequency and the value of the current, independently during the process.

5 8. Process according to the combination of Claims 1 to 6, characterized in that it consists in varying at least some of the various parameters, namely the form factor, the value of the potential, the frequency, the value of the current and the UA/IC ratio, simultaneously during the process.

10 9. Process according to one of Claims 1 to 8, characterized in that it consists in separately controlling its waveforms and the electrical power values VI in the positive phase and/or in the negative phase.

15 10. Electronic generator of the current source type for implementing the process according to one of Claims 1 to 9, comprising a unit (9) for connection to a single-phase or three-phase electrical supply from the mains and a unit for connection to the electrolysis tank, characterized in that it comprises:

20 25 - a module (10) for converting the sinusoidal AC signal delivered by the mains into a trapezoidal or sawtooth signal;

30 - a module (12) for modifying the slope and the form factor of the signal;

- a module (13) for varying the frequency in various types of cycle; and

- a module (14) for managing the electrical energy according to the parameterized energy and the energy used.

35 11. Generator according to Claim 10, characterized in that it includes, at the output, an isolating transformer with series-connected capacitors in the primary or the secondary, in order to filter the DC component so as to prevent the magnetic circuit from

saturating, while introducing optimum operating safety in respect of electrical protection, with connection of one of the poles to earth.

12. Generator according to either of Claims 10 and
5 11, characterized in that it is controlled by a PC-type processor (8) used to manage the various parameters during execution of the process.

Add AS